SR 2 Profitt's Point to Deception Creek
North Central Region

2004 MONITORING REPORT

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North Central Region 2004 Annual Monitoring Report

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Table of Contents

List of Acronyms

Acronym	Meaning
CI	Confidence Interval
ECY	Washington State Department of Ecology
FAC	Facultative Indicator Status
FACW	Facultative Wetland Indicator Status
IP	Individual Permit
MP	Mile Post
NWP	Nationwide Permit
OBL	Obligate Wetland Indicator Status
SR	State Route
USACE	United States Army Corps of Engineers
WDFW	Washington Department of Fish and Wildlife
WSDOF	Washington Department of Fisheries
WSDOT	Washington State Department of Transportation

Introduction

Infrastructure improvements including highway construction projects, highway interchanges, and bridges have accompanied economic and population growth in the state of Washington. The Washington State Department of Transportation (WSDOT) evaluates the potential for degradation of critical areas that may result from these infrastructure improvements. WSDOT strictly complies with applicable federal, state, and local environmental regulations, including the Clean Water Act and the state "no net loss" policy for wetlands (Executive Order 89-10). Generally, mitigation sites are planned when transportation improvement projects adversely affect critical and/or sensitive areas. The WSDOT Wetland Assessment and Monitoring Program monitors these mitigation sites as a means of evaluating compliance with permit conditions and tracking site development.

The purpose of this document is to report the status of North Central Region WSDOT mitigation sites with respect to permit compliance and success standards for 2004 (Map 1). Following a general description of our process and methods, this report documents recent management activities and final year monitoring results for the SR 2 Profitt's Point to Deception Creek mitigation site.

Process

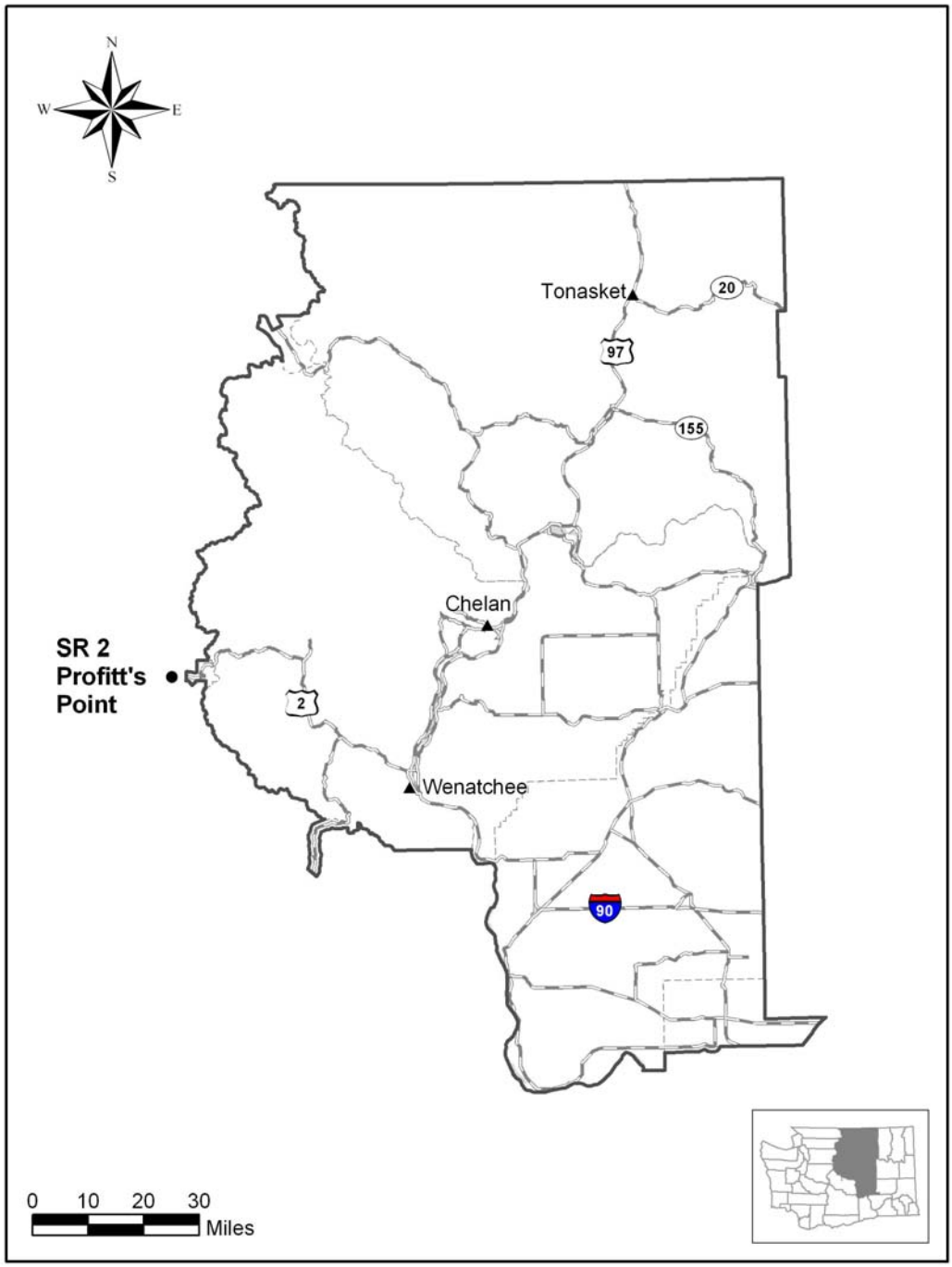
Monitoring typically begins the first spring after a site is planted and continues for the time period designated by the permit or mitigation plan. The monitoring period generally ranges from three to ten years. In special cases sites may be monitored beyond the designated monitoring period.

Monitoring activities are driven by site-specific success standards detailed in the mitigation plan or permits. Data are collected on a variety of environmental parameters including vegetation, soils, hydrology, and wildlife. When data analysis is complete, information on site development is communicated to region staff to facilitate management activities as part of an adaptive management process. Monitoring reports are issued to regulatory agencies and published on the web at:

http://www.wsdot.wa.gov/environment/wetmon/MonitorRpts.htm

Map 1

SR 2 Profitt's Point to Deception Cr. Mitigation Site Location



SR 2 Profitt's Point to Deception Creek King Co. Permit L95GL067

This report summarizes management and monitoring activities completed by the Washington State Department of Transportation at the SR 2 Profitt's Point to Deception Creek (Profitt's Point) site from Fall 2003 through Fall 2004. WSDOT Wetland Monitoring and Assessment Program activities were intended to address success standards for 2004. Activities include vegetation surveys, photo-documentation, and assessments of wetland hydrology. Table 1 provides general site information and Table 2 summarizes this year's monitoring results.

Table 1 General Information for the SR 2 Profitt's Point to Deception Creek Mitigation Site

King County DDES Permit Number	L95GL067
Township/Range/Section (impact)	T.26N/R.12E/S.25, 26, 27, 28
Mitigation Location	SR 2 south of MP 54, north of the Tye River, King County
Construction date	1998
Monitoring Period	2000 to 2004
Year of Monitoring	5 of 5
Area of Project Impact	0.7 acres
Type of Mitigation	Wetland Enhancement
Area of Mitigation	1.1 acres

Table 2 Monitoring and Management Summary for the SR 2 Profitt's Point to Deception Creek Mitigation Site

Performance Criteria	2004 Results[1]	Management Activities
Success Standard		
1. Fifth year survival	Not evaluated[2]	
2. Wetland hydrology field indicators	Present	
3. Measurable growth of planted species	0.24m average increase in height	
Contingency		
< 5% aerial cover by invasives	14% ($CL_{80\%}$ = 11% - 18%)	Weed Control
Other Information		
Cover by all woody species	92% ($CL_{99\%}$ = 86% - 99%)	

[1] Estimated values are presented with their corresponding statistical confidence interval. For example, 92% ($CI_{99\%}$ = 86-99% aerial cover) means we are 99% confident that the true aerial cover value is between 86% and 99%.

[2] Plant mortality and natural recruitment often confound results if survival is evaluated long after initial plant establishment. For this reason, fifth year survival was not assessed.

Success Standards and Sampling Objectives

The success standards for this mitigation site were excerpted from the *Profitt's Point to Deception Creek Project Mitigation Plan* (WSDOT 1996). Companion sampling objectives follow the success standards, where appropriate. Appendix 1 provides permit requirements and the complete text of the success standards for this project, and Appendix 2 shows the planting plan and photo-point locations.

Performance Standard 1
Survival of planted material in the wetland is over 75% for trees and shrubs in openings and over 60% for interplanted conifers on the rest of the site in year 5 (2004).

> Sampling Objective 1
> To be 80% confident the true aerial cover of woody species on the site is within 20% of the estimated value.[3]

Performance Standard 2
The planted trees and shrubs show measurable growth between annual sampling times based on plant height (2004).

Performance Standard 3
Measurements from a manual water level fluctuation gauge indicate that the maximum water depth in lowest areas (outside of drainage courses) in the wetland is greater than 10 cm (4 inches) at least once per year.
OR
There is evidence that water is ponded in any part of the wetland for more than 7 consecutive days per year. Evidence of ponding may be any of the hydrologic indicators of such conditions identified in the US Army Corps of Engineers wetland delineation manual (Environmental Laboratory 1987) (2000-2004).

Contingency
Noxious weeds will be eliminated immediately if found on the site, before large populations can establish. A weed control program will be implemented if more than 5% of the coverage in the wetland is deleterious exotic species. (2004).

> Sampling Objective 2
> To be 80% confident the true aerial cover of deleterious exotic species on the site is within 20% of the estimated value

[3] Cover by woody species was estimated as a surrogate for fifth year survival.

Methods

After 5 years, it was impossible to determine if a tree or shrub was pre-existing, planted, or a volunteer. Areas that had been cut and planted with trees and shrubs were not distinguishable from the rest of the site. The fact that dead planted woody species often vanish after time, further complicates efforts to assess survival.

As a surrogate for survival (Performance Standard 1), aerial cover information was collected on all woody species using the line-intercept method. Aerial cover was estimated using 26 temporary transects placed perpendicular to a baseline using a systematic random sampling method (Figure 1). Eighteen 100-meter line-segment sample units were randomly positioned along sampling transects. These sample unit locations were also used to evaluate aerial cover of invasive species (Contingency) using the point-intercept method (200-point sample units).

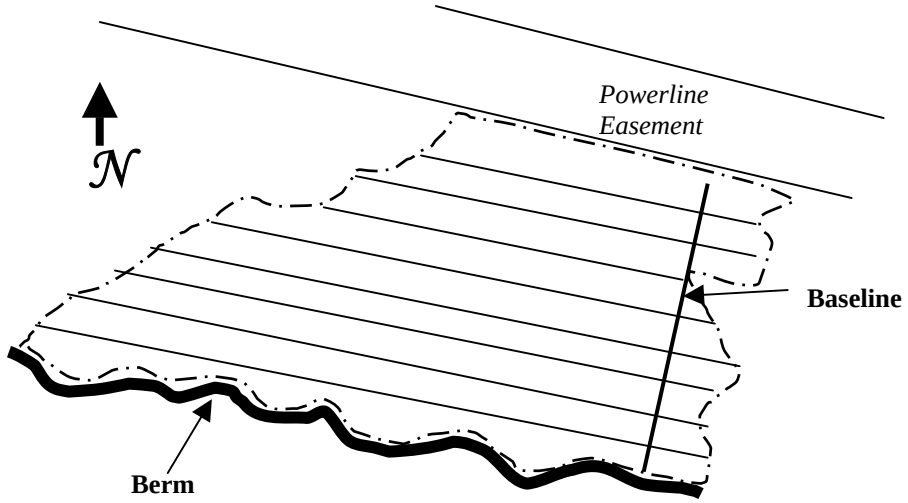


Figure 1 SR 2 Profitt's Point to Deception Creek Mitigation Site Sampling Design (2004)

Sample size analysis was conducted using the following equation.

$$n = \frac{(z)^2 (s)^2}{(B)^2}$$

z = standard normal deviate
s = sample standard deviation
B = precision level[4]
n = unadjusted sample size

Photographs were taken at permanent photo points with a survey rod to address Performance Standard 2.

[4] The precision level equals half the maximum acceptable confidence interval width multiplied by the sample mean.

To evaluate wetland hydrology (Performance Standard 3), the site was visited in early April and May, and wetland hydrology field indicators were recorded.

For additional details on the methods described above, view WSDOT Wetland Mitigation Site Monitoring Methods at:
http://www.wsdot.wa.gov/environment/biology/docs/MethodsWhitePaper052004.pdf

Results and Discussion

The primary goal of this mitigation project was to enhance a low quality wetland through selective clearing and subsequent planting of additional tree and shrub species. At the close of the five year monitoring period, this effort appears to have been successful with a native tree and shrub mix of 21 species developing on site (Table 3). This plant community is beginning to support secondary site goals such as the provision of wildlife habitat and food chain support. Examples include greater habitat complexity, opportunities for nesting and perching, fruit and seed production, and leaf litter production. Ten species of birds and evidence of bear and canids were observed on site during the monitoring period.[5] Finally, the site goal of flood attenuation has been satisfied due to the successful construction of a berm on the southern end of the site. During high water events in the nearby river, the berm is intended to retain surface water arriving on site through sheet flow, thereby reducing the volume of downstream flooding. Results for specific success standards follow.

Success Standard 1 – Fifth Year Survival
According to the mitigation plan (WSDOT 1996), the planted area was dominated by pole-sized *Populus balsamifera* (black cottonwood) and *Alnus rubra* (red alder) with an intermediate layer of *Salix sitchensis* (Sitka willow) and *Acer circinatum* (vine maple) prior to planting. To increase spatial diversity, WSDOT cut down *A. rubra* and *P. balsamifera* in four areas and planted trees and shrubs in the openings. Conifers were interplanted under the existing canopy. The planting plan specified 75 *Thuja plicata* (western red cedar), 50 *Abies grandis* (grand fir), 50 *Cornus sericea* (redosier dogwood), 50 *Physocarpus capitatus* (Pacific ninebark) and 50 *Sambucus nigra* (blue elderberry).

Survival was evaluated in years 1 and 3 using total counts (WSDOT 2000 and WSDOT 2002). In 2002, survival in the openings was 96%, and 99% in the interplanted areas. At that time, the planted woody species were considered to be well established. These survival percentages exceeded the third year requirements. Survival was not evaluated in year five due to the difficulty of distinguishing planted trees and shrubs from volunteers. Aerial cover of all woody species was calculated as a surrogate for survival in 2004 and is estimated to be 92% ($CI_{99\%}$ = 86-99%). This suggests that the created openings are filling in as intended.

[5] Bird species documented on site include: Red-Breasted Sapsucker, Black-capped Chickadee, Song Sparrow, Ruffed Grouse, Golden-crowned Kinglet, Red-breasted Nuthatch, Black-throated Gray Warbler, American Crow, American Robin and Dark-eyed Junco.

Table 3 SR 2 Profitt's Point to Deception Creek 2004 Observed Native Woody Species

Scientific Name	Common Name	Indicator Status	Tree or Shrub at Maturity	Source of Fruit or Seed for Wildlife[6]
Abies grandis	grand fir	FACU-	Tree	
Acer circinatum	vine maple	FAC-,	Shrub	X
Alnus rubra	red alder	FAC	Tree	
Acer macrophyllum	bigleaf maple	FACU	Tree	
Cornus sericea	redosier dogwood	FACW	Shrub	X
Holodiscus discolor	oceanspray	NL	Shrub	
Lonicera involucrata	twinberry	FAC+,	Shrub	X
Oemleria cerasiformis	Indian plum	FACU	Shrub	X
Physocarpus capitatus	Pacific ninebark	FACW-	Shrub	
Populus balsamifera	black cottonwood	FAC	Tree	
Pseudotsuga menziesii	Douglas-fir	FACU	Tree	
Ribes sanguineum	redflower currant	NL	Shrub	X
Rubus leucodermis	whitebark raspberry	NL	Shrub	X
Rubus parviflorus	thimbleberry	FAC-	Shrub	X
Rubus spectabilis	salmonberry	FAC+	Shrub	X
Salix lucida	Pacific willow	FACW+	Tree	X
Salix sitchensis	Sitka willow	FACW	Shrub	X
Sambucus nigra	blue elderberry	FACU	Shrub	X
Symphoricarpos albus	snowberry	FACU	Shrub	X
Thuja plicata	western red cedar	FAC	Tree	
Tsuga heterophylla	western hemlock	FACU-	Tree	

Dominant species in the northern third of the site include *P. balsamifera* and *Salix* spp. (willows) with an understory of *A. macrophyllum, A. circinatum, R. spectabilis,* and *R. parviflorus*. This area appears to have a medium height canopy compared to the rest of the site. The center section of the site is dominated by *R. spectabilis* with components of *O. cerasiformis* and *H. discolor*. In the eastern end of the site, the canopy consists of *P. balsamifera* with patches of *A. rubra*, *Salix* spp., and *A. grandis*, with an understory of *R. spectabilis* and *R. parviflorus*. In the western end of the site the canopy is dominated by *P. balsamifera, Salix* spp., and *A. rubra,* with an understory of *A. macrophyllum*, *R. spectabilis* and *H. discolor*. The following conifers are present as understory species: *A. grandis, P. menziesii, T. heterophylla,* and *T. plicata*. A transition to structurally complex forested and shrub-scrub wetland has been initiated, thus meeting the primary goal of enhancing the wetland at this mitigation site. Based on the above information, we believe the intent of Success Standard 1 has been met.

Performance Standard 2 - Planted Woody Species Show Measurable Growth

At six photo-points, four plants have grown at least 0.2 meters since last year, and one did not appear to have increased in height (Table 4). The average increase in height since 2003 is 0.23 meters. Based on 2001 data and information from the site manager, these plants were probably less than a meter tall when planted. It appears that planted woody species are increasing slowly in height. Locations of these photo-points are identified in the planting plan in Appendix 2.

[6] Cooke 1997.

Table 4 SR 2 Profitt's Point to Deception Creek Measured Differences in Height

Photo-Point	*Scientific Name*	2003 Height (m)	2004 Height (m)	Growth Measured
1	*Thuja plicata*	1.1	1.3	0.2
2	*Thuja plicata*	1.1	1.4	0.3
3	*Lonicera involucrata*	1.7	1.7	0.0
4A	*Abies grandis*	1.5	1.8	0.3
5A	*Acer circinatum*	3.3	3.6	0.3
6A	*Physocarpus capitatus*	1.4	1.7	0.3

Performance Standard 3 - Indicators of Wetland Hydrology 7 Consecutive Days

Water at the staff gauge was not observed at greater than 10 centimeters during intermittent monitoring visits over five years. Hydrologic conditions achieving option one in the hydrology standard (Success Standard 3) were therefore, not confirmed. Site observations indicate the hydrology at this site during the growing season is largely sub-surface with shallow inundation observed during a few monitoring visits. Another indicator of wet conditions in the area adjacent to the berm is the presence of the FACW species *Juncus effusus* (soft rush). The data summarized in Table 5 was collected to address option two for Success Standard 3 (observance of hydrologic indicators for 7 consecutive days).

Table 5 SR 2 Profitt's Point to Deception Creek Hydrology Observations

Date	Surface Water Description	Pit Information
15 May 2000	Not observed	A 10-inch pit was not saturated.
5 April 2001	Lowest areas with very shallow standing water	N/A
16 April 2002	Three areas with surface water 1-2dm	N/A
16 May 2002	Not observed	No saturation in the soil to 16 inches
27 May 2003	Saturated to the surface at staff gauge	No saturation or inundation within 12 inches of the surface near the berm in 2 pits
5 June 2003	Surface water not observed	N/A
29 Mar, 2004	Small areas of inundation 0.2dm of standing water	One of 4 pits had water at 6 inches in depth, another was saturated at 16 inches.
20 April 2004	Standing water in SW corner of site along the berm	One of 3 pits had water present at 12 inches depth.

Observed surface water has been limited to small low areas (such as illustrated in Photo 1) in the months of March and April. Pits excavated to 16 inches in areas without surface water are often not saturated by May. It appears that US Army Corps of Engineers wetland hydrology indicators are typically present in late March through April. A consulting firm initially delineated the site as wetland in 1992, prior to the enhancement project. A wetland delineation was also performed in 2003 confirming that the enhancement area meets wetland criteria. Wetland delineation results are documented in the *WSDOT Mitigation Sites North Central Region 2002 Monitoring Report* (WSDOT 2002 (http://www.wsdot.wa.gov/environment/wetmon/docs/2002NC_Report.pdf.)).

Photo 1 **SR 2 Profitt's Point to Deception Creek (March 2004).**

Contingency –Weed Control if More Than 5% Aerial Cover by Deleterious Exotics

An annual weed control program was implemented in 2000, satisfying this contingency. Table 6 summarizes management activities conducted through the summer of 2004. Despite these prior weed control efforts, aerial cover provided by invasive species on the entire site in July 2004 was estimated to be 14% ($CI_{80\%}$ = 11-18% cover). Most of this cover was provided by *Geranium robertianum* (stinky Bob) in the west quarter of the site. Three other species of concern: *Senecio jacobaea* (tansy ragwort), *Leucanthemum vulgare* (oxeye daisy), and *Rubus armeniacus* (Himalayan blackberry) contributed to the above cover estimate. After monitoring, *G. robertianum* was hand pulled twice in August and twice in September 2004. In addition, *S. jacobaea* was sprayed on the borders of the site in August. Though weed presence is undesirable, the overall site goal of forested wetland enhancement through adding structure and complexity does not appear to be compromised.

Table 6 **Management Activity Summary for the SR 2 Profitt's Point to Deception Creek Mitigation Site (2000-2004)**

Date	Management Activites
Summer 2004	Weed control focused on *G. robertianum, L. vulgare, Hypericum perforatum* (common St. Johnswort), and *Tanacetum vulgare* (common tansy).
Summer 2003	Weed control primarily targeted *G. robertianum*
Summer 2002	*G. robertianum* was hand pulled and *S. jacobaea* was removed from the perimeter of the site
Summer 2001	*G. robertianum*, *Cirsium vulgare* (bull thistle), and *S. jacobaea* were hand pulled

Appendix 1

Profitt's Point Permit Requirements

The following excerpts are from pages 5 and 6 of the *King County Grading Permit* L95GL067 dated 14 November 1996.

8012 - A five-year monitoring plan shall be implemented with yearly monitoring reports submitted to DDES for review and comment. If the mitigation goals and objectives are not met at the end of the monitoring period, WSDOT will be responsible for the preparation and completion of a contingency plan to remedy the situation.

W212 - The permittee shall submit a monitoring schedule within 30 days of completing the wetland mitigation site. The schedule shall include submittal of a wetland delineation at the end of the third year monitoring period. If wetland hydrology performance standards are not met at the end of three years, a contingency plan shall be submitted no later than 90 days after the 3rd year monitoring is concluded.

Profitt's Point Success Standards

The following excerpt is from the *Profitt's Point to Deception Creek Project Mitigation Plan* (WSDOT 1996). The standards addressed this year are identified in **bold** font.

Goals, Objectives, and Standards of Success
The primary goal is to enhance an existing low quality wetland. A transition from young deciduous scrub-shrub community to structurally complex forested and scrub-shrub wetland is expected. The enhanced wetland will provide the following functions: wildlife habitat, food-chain support for fish and wildlife, and limited floodwater flow attenuation and water storage. The site is designed to include forest, scrub-shrub, and upland buffer.

The mitigation plan is designed to promote the growth of native vegetation. Attempts will be made to limit the spread of exotic species, which will not be allowed to dominate the site. Noxious weeds will be eliminated immediately if found on the site, before large populations can establish. A weed control program will be implemented if more than 5% of the coverage in the wetland is deleterious exotic species.

Objective 1: Enhance existing wetland by creating spatial openings where conifers and shrubs will be planted and interplant conifers throughout, increasing plant diversity in the short-term and structural diversity over the long-term.

Performance Standard:
After one year:

- Survivorship of the planted material in the wetland is over 90% for trees and shrubs in openings and interplanted conifers on the rest of the site.

After three years:

- Survivorship of the planted material in the wetland is over 85% for trees and shrubs in openings and over 70% for interplanted conifers on the rest of the site.
- The planted trees and shrubs show measurable growth between annual sampling times based on plant height.

After five years:

- **Survivorship of the planted material in the wetland is over 75% for trees and shrubs in openings and over 60% for interplanted conifers on the rest of the site.**
- **The planted trees and shrubs show measurable growth between annual sampling times based on plant height.**

Objective 2: Hydrology of the site is successfully augmented by holding water for short periods during the spring runoff each year.

Performance Standard:

- **Measurements from a manual water level fluctuation gauge indicate that the maximum water depth in lowest areas (outside of drainage courses) in the wetland is greater than 10 cm (4 inches) at least once per year.**

or

- **There is evidence that water is ponded in any part of the wetland for more than 7 consecutive days per year. Evidence of ponding may be any of the hydrologic indicators of such conditions identified in the US Army Corps of Engineers wetland delineation manual.**

Contingency Plans for Deleterious Exotic Species

The mitigation plan is designed to use and promote the growth of native vegetation. Attempts will be made to limit the spread of exotic species, which will not be allowed to dominate the site. Noxious weeds will be eliminated immediately if found occurring on the site, before large populations can establish. **A weed control program will be implemented if more than 5% of the coverage in the wetland is deleterious exotic species.**

Operation and Maintenance

The goal of the wetland mitigation plan is to create a self-sustaining system that requires very little maintenance. Maintenance will consist of cleaning up trash, repairing vandalism to the berm or plantings, and controlling noxious weeds. The site will revert back to USFS after environmental monitoring is complete.

Photo Point 1

Photo Point 2

Photo Point 3

Photo Point 4A

Photo Point 5A

Photo Point 6A

Appendix 2

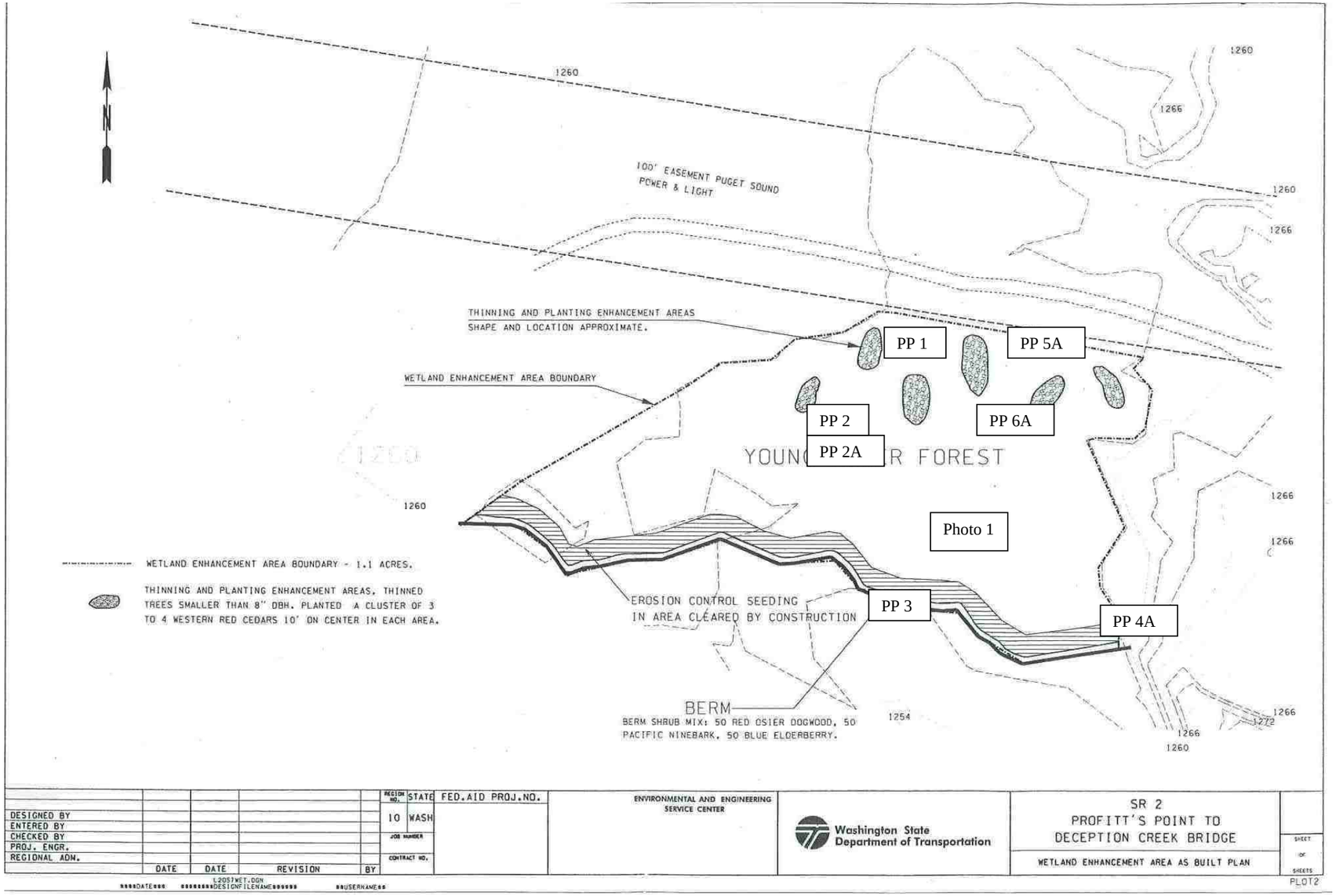
Profitt's Point to Deception Creek As-Built Planting Plan
(WSDOT 1996)

Key

Photo Point Locations

PP 4A

Photo Orientation



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